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SYMPOSIUM

BY THE

CUYAHOGA COUNTY MEDICAL SOCIETY

OF

CLEVELAND, OHIO.

1900.

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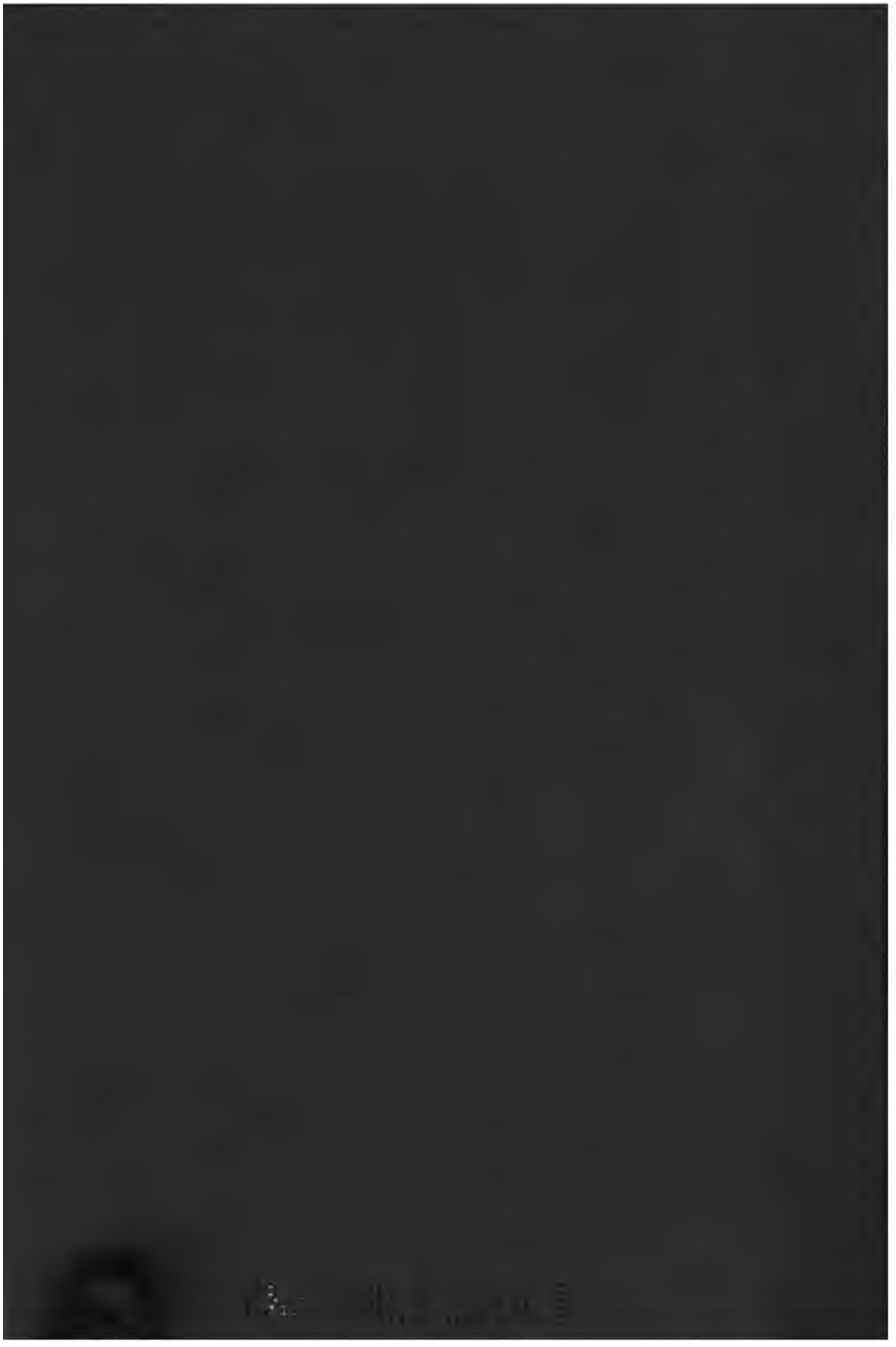

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Symposium on Appendicitis.

PAPERS PRESENTED AT THE MEETINGS OF THE CUYAHOGA COUNTY MEDICAL SOCIETY, IN CLEVELAND, ON THE EVENINGS OF THE 4TH AND 18TH OF OCTOBER, 1900.

ETIOLOGY OF APPENDICITIS.

BY GUY H. FITZGERALD, M. D.

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The predisposing causes of appendicitis are many. The organ is functionless so far as we know, and being rudimentary it is less resistant to infections and less able to repair damage when done. It is a closed tube with a common opening for the entrance and egress of foreign bodies and hence the drainage at times must be faulty. This is especially true when the organ hangs dependant or when bent or twisted upon itself. The blood supply through the appendicular artery may be partially or completely shut off by torsion or kinking of the organ and by twists of its mesentery. Pressure from tumors and embolism, too, may obstruct the circulation.

The large amount of lymphoid tissue in the appendix must prove an important factor. This tissue, similar in structure to that of the tonsil, has led some to assume that the appendix is subject to similar disorders and on this basis account for recurring attacks of the disease.

A preceding attack of some gastro-intestinal trouble is often a determining factor. A catarrhal process involving the musoca of the caecum may reach the appendix by extension. Typhoid ulceration may occur in the glands of the appendix and tuberculosis may be present when the neighboring structures are affected or when the tubercular focus is in some distant organ. Pus tubes and pelvic disease in general may reach the appendix, especially when it extends down into the pelvis. Actinonycosis has been demonstrated as one of the causes of appendicitis. As predisposing, if not direct, causes of appendicitis dysentery, lead poisoning, influenza and rheumatism may be mentioned. The latter two diseases have been supposed to affect the lymphoid tissue in particular. The disease is most common between the ages of 15 and 30 and it is about twice as common in males as in females. Traumatism may be mentioned as one of the factors and a severe strain in lifting heavy loads, jolts, etc., are quite often assigned as a cause. Rare cases are those in which new growths, both benign

and malignant, hydatids, etc., occlude the lumen or interfere with the blood supply and thus cause the disease. Foreign bodies bear a minor part in appendicitis. Seeds of various kind, intestinal parasites, spicules of bone, and other foreign bodies may enter the lumen, act as irritants and become exciting causes of appendicitis, but this is an infrequent occurence. Calculi are often found in the appendix. They may sometimes be forced in from the caecum, but more often they are found in the appendix. During a catarrhal inflammation of the mucosa an exudate is thrown off and this mixed with granular debris, desquamated cells has lime salts, cholesterine and other matter deposited upon it and thus a calculus is formed. The peristalsis of the organ in attempts to dislodge it moulds it into the form usually found. Once formed, a calculus may prove an important factor in further trouble. It may act as an irritant to the mucosa and by pressure lower its vitality so that the bacteria, already present, have a media favorable for growth.

As a sequel to ulceration of the mucosa there often results a stenosis due to the formation of scar tissue. This narrowed area may interfere with drainage of the organ and when it does so becomes an important factor. This is especially true when the contracted area is near the base or in the body of the organ. Healed ulcers on one side by contracting may start a kinking of the appendix and thus interfere with its free drainage. Anything which interferes with free drainage will predispose to if not cause appendicitis. When the tube is closed the bacteria present seem to assume a greater virulence. Kinks or twists due to a long or short mesentery, an appendix which hangs low in the pelvis or one which is bent up behind the colon so that the contents of the caecum may interfere by pressure are all important.

The bacillus coli communis is the most common organism in appendicitis. Associated with it may be a number of others, especially staphyococci and streptococci. Rarer organisms are the pyocyancous, prodigeosis, subtilis. The coli communis alone, however, may be found in those severe cases called "fulminating" appendicitis.

A study of 42 cases in the surgical service of Drs. Bunts and Lower shows the following facts which may have a bearing on the etiology: There were 26 males; 16 females. Average male age, 25.6; female, 21:5 years. The oldest patient was 66, the youngest 6, both females. In twenty-one cases a history of some preceding gastro-intestinal disturbance was elicited. Three patients had had rheumatic attacks during the preceding year. In

two cases the attack seemed to follow closely a mild form of influenza. Eight patients had had typhoid, but in none was it recent. In eighteen cases there was constipation and four had been troubled with diarrhœa. Two patients had received an injury which was followed promptly by appendicitis. A little girl of six had been kicked in the abdomen by a playmate and a woman 36 had fallen down a cellarway and landed on the corner of a box which struck her in the right iliac region. Three patients attributed the disease to heavy strains in lifting. In eight cases nothing could be adduced from the history which would have any bearing on the causation. Thirteen appendices were behind the colon and seventeen were in the pelvis. Of the latter, one was across the median line on the left side and was adherent to and ruptured into the bladder. In four cases there was a distinct kinking and fifteen specimens showed areas of stenosis. Two specimens were mere pus sacs. Thirteen cases had a short mesentery, while in twelve it was longer than usual. Tuberculosis was demonstrated in two cases, twice in appendices in contact with tuberculous tubes and once in a patient who had a tubercular process in the left apex. Calculi or concretions were found in twenty-seven specimens and one appendix contained a seed.

Inoculations were made from the peritoneal surface of the appendix in all cases. In some inoculations were made from the interior also. The inoculations from the peritoneal surface of those appendices which were not gangrenous or rupture were sterile. Of the pus cases, twenty-four in number, one proved sterile. This was an old case on its way to recovery. Twenty-three cases showed the presence of the bacillus coli communis. In six cases it was associated with staphylococci, five times with aureus and once with citreus; no strepticocci were found. The most severe cases produced only coli when inoculated on agar.

DIAGNOSIS OF APPENDICITIS.

BY CHARLES B. PARKER, M. D.

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There are no pathognomonic signs of appendicitis, nor is the presence of any one sign alone sufficient to make a certain diagnosis. In most cases the diagnosis may be made upon the following symptoms being present:

1. Sudden onset in one previously well with or without vomiting.

2. "Board-like" condition of the right abdominal wall.
3. Pain at the McBurney point.

First. The sudden onset in one previously well is characteristic of appendicitis.

This sudden onset in one perfectly well is most marked in first attacks, but is also present (its suddenness is marked) in many cases of recurring appendicitis. It is an important differential sign as we shall see further on.

Second. The board-like condition of the abdomen. This is present and localized on the right side, or it may extend over the entire abdomen in severe fulminating cases. It is to be distinguished from a tumor or other condition within the abdomen. It appears early, before any tumor has formed, and it persists. It cannot easily be mistaken, and its absence casts doubt upon the presence of any inflammation of the vermiform appendix.

Third. Pain. While pain varies greatly in degree in various subjects, it is usually present. The patient is not always able to locate the pain in the appendicular region in the beginning of the attack, but in the great majority of cases the pain is accentuated at the McBurney point.* Sooner or later the fleeting pains felt at various parts of the abdomen become centered at this point. Exceptions certainly do occur. I recall the case of a patient where the pain continued acute in the region of the gall bladder and was never marked in the appendiceal area except upon pressure. I recall the case also of a physician who never clearly located the pain in his right groin though he had repeated recurrent attacks. Pain may also be accentuated by palpation.

The amount of tenderness usually corresponds in some measure to the degree of inflammation. If the tenderness is markedly increased it may indicate the formation of pus, or even the beginning of gangrene. Again, where the tenderness is markedly increased with symptoms of collapse and vomiting, it may indicate perforation and general peritonitis. Whenever the tenderness is decreased during the course of an attack, it may be due to the discharge of a concretion from the appendix, or it may be caused by the free evacuation of the bowels, or, again, it may indicate the most complete and extensive sepsis. The cessation of pain, therefore, is by no means a favorable symptom, and when it occurs with other evidences of blood poisoning, it should be regarded as a most unfavorable diagnostic sign. When the cessation of pain is

*A point midway of a line drawn from the umbilicus to the right anterior superior spine.

complete and abrupt, it indicates extensive gangrene of the appendix. When the pain occurs at other than the typical point, it is due to the fact that the appendix lies out of its usual position, or is very long, or the perforation is at or near its apex and the abscess formed beyond. Thus pain on the left side in appendicitis usually indicates that the appendix extends into the pelvis, and this is rendered more certain if vesical symptoms are present. When the pain occurs in the hepatic region, the appendix usually lies forward under the colon with a distal perforation and an abscess extending up under the liver even under the renal fat. The pain, then, indicates the location of the inflammation and its extent. When the pain is excessive it usually indicates pus formation. To determine the presence of the diagnostic points mentioned we make use of the following methods of examination:

1. History. The previous history of the case, including a minute account of any deviations from a perfect state of health, must be carefully noted. This account should be given in the patient's own words with as little questioning as possible and carefully noted, with special reference to suddenness of onset and as to there having been previous attacks. A side remark of the patient may be of great importance.

2. Palpation. This means of diagnosis is becoming generally employed, and various suggestions are put forth as to how it should be done. It is well, having the patient in the recumbent position, with the head high and the legs flexed upon the thighs and the thighs upon the abdomen, to steady the abdominal wall with the four fingers of the left hand placed just below and to the left of the umbilicus, and then with the fingers of the right hand make firm pressure downward into the right iliac fossa and drawing the fingers firmly over the surface of the iliacus and psoas muscles, and in most cases, even where there is no disease, you can palpate the appendix. I have thought that the appendix has a sensitiveness of its own in a normal condition, and the elicitation of pain must be rather pronounced before we can predicate upon it the diagnosis of inflammation. Indeed, I think an appendix which has once been inflamed is ever afterward more or less sensitive to palpation. It is very easy to err in palpating the appendix. I recall the prediction of Dr. Morris, at his clinic, which did not materialize. I recall one case in which it was quite easy to palpate the appendix; and I diagnosed a thick, chubby appendix; it proved upon operation that the part felt was the normal proxymal portion, while the diseased portion was very much atrophied.

3. Rectal, or rectal and vaginal examination. Such examination often discloses the true condition of the appendix, especially if it is low down in the iliac fossa or in the pelvis. Such examination is also of the greatest aid in the differential diagnosis of this condition from the multitudinous inflammations and new formations which occur in the pelvis and its organs.

4. Temperature. The temperature may be only slightly elevated, though there is always some rise above the normal. If it becomes subnormal, pus has probably formed, or perforation taken place. It is not a very reliable aid in diagnosis, for it may be only a trifle above normal when the patient is suffering from extensive abscess. The remission of temperature is no indication that the patient is recovering, and perforation, collapse and death may follow a sudden fall of temperature to the normal or subnormal.

Tumor. Tumor is not present in cases of recurring appendicitis. When it is present it indicates an inflammatory mass, and if the inflammation has existed more than three days it usually indicates pus, but rarely can actual fluctuation be made out.

As I remarked earlier, the diagnosis can be made in most cases, especially in recurring attacks where the history clearly indicates the condition. In fulminating appendicitis with perforation and general peritonitis, the severity of the symptoms, the shock, the rapid onset and the course render the diagnosis easy and certain.

The differential diagnosis of appendicitis from other conditions which may be present is often very difficult. The symptoms are often very similar and the conditions which might be present are so numerous, including diseases of the liver, the right kidney, the pelvic organs, typhoid fever, psoas abscess, intestinal obstruction and even acute indigestion. Most frequently we are called upon to distinguish it from typhoid fever, right renal colic, hepatic colic, acute indigestion and stercoral typhlitis. The differentiation from typhoid fever is the most frequent and also the most difficult. The sudden onset in one otherwise healthy, the board-like abdomen, the possible history of a previous attack, all these point unmistakably to the diagnosis of appendicitis. The lassitude, the gradual onset, the bleeding from the nose and the characteristic morning and evening fluctuation of temperature point to typhoid fever. The palpation, abdominal or rectal, of mass in the abdomen completes the differential diagnosis. From the later indications of typhoid fever it is not always possible to

make so exact a differentiation. In such a case the entire history with the symptoms must be taken in review and usually a correct diagnosis can be made.

From the inflammatory diseases of the pelvis, such as pyosalpinx and ovarian abscess, from the tumors, such as ovarian, fibroid and extra-uterine pregnancy, from the painful menstruations and the disturbances of the menopause, all of which conditions may simulate the symptoms of appendicitis. A correct differentiation can be made by a careful review of the history, and by a careful examination, under anesthesia, if necessary, of the parts involved. It will be found that the appendicular inflammation is less intimately related to the uterus, is more remote from it. Furthermore, each of these pelvic diseases has symptoms of its own; for instance, with fibroid tumor we have menorrhagia; with pyosalpinx and ovarian abscess, we have evidences of septicemia; in painful menstruation, very often both ovaries are affected and we thus have the pain on both sides. The pain is paroxysmal and severe at first and the menstrual flow is present.

Of the conditions of the kidney which may be most readily confounded with appendicitis, we have nephritic colic, pyonephritis, growths of the kidney. In renal colic the pain is over the kidney or radiates to the testicle or bladder. The urine contains blood and other evidences of renal disease. There is an absence of the usual signs of appendicitis.

Hepatic colic is to be distinguished by the history of previous attacks accompanied by jaundice, together with sudden, sharp, cutting pain in upper right hypochondrium and extending through to the back, together with some vomiting. If there is tenderness over the gall bladder without signs in the right iliac fossa, the diagnosis of hepatic colic is complete.

Acute indigestion may in its beginning be mistaken for appendicitis. Although the symptoms may be identical the first few hours, the rapid improvement within a short time under simple home remedies and diet determines the diagnosis.

I have never met, or at least recognized, a case of stercoral typhlitis. We are assured on good authority, however, that such a pathologic condition does exist and that its symptoms are those of appendicitis. Indeed, that appendicitis is often caused by the inflammation in the head of the colon due to retained foecal matter. This inflammation may go on to softening and perforation of the coecum and abscess formation, a condition if examined at this

point could not be distinguished from an abscess due to perforation of the appendix.

This condition of stercoral typhlitis occurs most frequently in middle and later life when appendicitis is less likely to occur. The diagnosis can only be established when the doughy, saussage-like mass can be felt in the coecal region. As this putty-like mass can only be felt in the first stages of the disease, you can see it is likely to be overlooked. The pain and the fever are not so marked as in appendicitis. Constipation, complete, or else a spurious diarrhœa may be present.

Cancer of the cecum. In this condition the age of the patient, the absence of temperature and the character of the tumor ought to make diagnosis easy.

Tubercular peritonitis. The appearance of the patient, the chronicity of the affection, the entire abdomen affected, the pain general, are sufficient points for a differential diagnosis. From psoas abscess the differentiation may become difficult, especially when the abscess is small and has not yet reached Scarpa's triangle. In this case the appearance of the patient, the rigid spine, the length of time the condition has existed, the temperature indicative of tuberculosis, all tend to the diagnosis of psoas abscess. The flexure of the thigh upon the abdomen usually occurs with the advance of the psoas abscess, and also occurs in cases of appendicitis, but is far more frequent in the former condition, and the presence of appendicular tumor or the determination of fluctuation in the psoas abscess will decide the final diagnosis.

To recapitulate. According to Deaver, the three cardinal signs are: "1. Sudden acute pain in one previously well. 2. Unnatural rigidity of abdominal wall. 3. Hardness over site of appendix at McBurney's point.

Tenderness increased—

1. Early pus formation.
2. Gangrenous change.
3. Perforation.

Tenderness decreased—

1. Discharge of foecal concretion.
2. After free evacuation.
3. In late pus cases with enough septic absorption to paralyze nerve filaments.

Distinction, when local, due to localized peritonitis, when general, due to: 1. Constipation. 2. Opium. 3. Paralysis of intestines. 4. Mechanical obstruction. 5. General peritonitis."

THE PROGNOSIS OF APPENDICITIS.

BY CHARLES G. FOOTE, M. D.

Assistant to the Chair of Surgery, Cleveland College of Physicians and Surgeons.

The prognosis in any case of appendicitis should be guarded. Although the large majority of such cases, irrespective of the treatment instituted, recover, or apparently so for the time being, still one can never say positively in any given case that the patient will get well; for fatal complications may occur even in the seemingly mild cases.

There are a number of things which should be considered before giving a prognosis, such as the character and severity of the infection, the plan of treatment followed out, the condition of the patient, the time at which he is seen, and the presence of certain complications as abscess, perforation, obstruction, general peritonitis, etc.

As to the character of the infection. If the bacillus coli commune is found in pure cultures, or even associated with staphylococci, the prognosis is generally better than in those cases of streptococcus infection, with or without the presence of the colon bacillus, which are usually violent in their onset and rapid in their course. It is in this variety of the disease that fatal complications are most liable to occur. The cases of simple catarrhal appendicitis almost always recover, at least for the time being, no matter what plan of treatment is pursued. Although undoubtedly a large number of these cases do not relapse, still there is no way of telling which ones will recur, nor what the severity of the next attack will be. As a rule, however, each succeeding attack is more serious than the preceding one. With operation both during and between attacks, the mortality is practically nil. In those cases of chronic or recurrent appendicitis, where the patient is rendered an invalid, although severe complications are not so liable to occur, operation offers the only hope of cure with a very slight mortality. In those cases complicated with gangrene, abscess, perforation, general peritonitis, etc., the prognosis is grave, but where operation is made early is much more favorable. Such cases treated expectantly show 52 per cent. of recoveries as against 85 per cent. treated surgically. (Frank Hartley Dennis' System of Surgery.) The so-called fulminating cases with general peritonitis are almost invariably fatal, no matter what treatment is pursued.

The presence of a marked leucocytosis is indicative of a high grade of infection and should always be taken into account. Its absence is evidence of either a mild infection or a diminished resistance on the part of the patient.

The prognosis must be modified according to the condition of the patient. In robut individuals in the absence of complications, with leucocytosis, the prognosis is favorable. In those of diminished powers of resistance, with marked symptoms of infection, and with no leucocytosis, it is correspondingly bad.

Probably that which determines most the outcome of the case, is the method of treatment. The general concensus of opinion at the present day is that appendicitis is a surgical disease. The old method of treatment with opium is referred to, only to be condemned. It masks the true nature and severity of the condition and gives a false sense of security to the physician.

I believe we can safely make the statement that the conditions for operation being favorable, the prospects for a speedy and permanent recovery are much better with operation than without.

The time at which the patient is seen by the surgeon is of great importance in determining the outcome. As a general rule, the earlier the operation is done the more favorable the prognosis. There is no excuse for temporizing, except the attack be the initial one, and of a mild character, or the conditions for operation unfavorable, and that the patient be placed under the careful supervision of an intelligent physician. If the patient has had one attack, and at the expiration of a year there be no relapse, the chances of recurrence are very slight and operation is not indicated.

MEDICAL TREATMENT OF APPENDICITIS.

BY L. B. TUCKERMAN, M. D.

Visiting Physician to St. Alexis Hospital.

Before the pathology of inflammations about the caput coli was understood as now,—long before surgical intervention was though of except in cases where there was clear evidence of abscess, people had appendicitis not infrequently, and by far the larger portion of them recovered. I think we must concede that since the epidemic of grippe ten years ago cases of appendicitis have been more numerous than formerly and, probably, of severer type as well. Moreover, with our greater precision in diagnosis of the exact location of the disturbance we now include every case

of pain, vomiting, rigidity of abdominal muscles and local tenderness as appendicitis, whereas, formerly, the additional symptom of chill, fever, and local induration were considered as entering into the diagnosis of typhlitis or perityphilitis, as the ailment was then called. When we bear in mind the anatomy of the appendix, a non-elastic tube of serous membrane, containing within it a muscular tube, and within that, in turn, a secreting tube of small calibre consisting of mucous and lymphatic tissue, it is evident that the closure of the lumen at the cecal end with retention of secretion and the consequent excrutiating pain, and its reflexes, vomiting and rigidity of the abdominal walls, may be caused by swelling of the muco-lymphoid tissues of the inner tube or by energetic contraction of the muscular fibres of the middle tube, or both. This retention of the secretion under pressure tends to produce necrosis of the inner and middle coats of the appendix, and, later, perforation of the serous coat, and before that occurs, migration of bacteria causing inflammation of the serous coat with adhesion. In the beginning of the attack, before necrosis has taken place it is a rational thing to seek by means of antiphlogistics and antispasmodics to reduce swelling of the mucous membrane, to allay the spasm of the muscle, and to check the development of inflammation in the serous coat. There are three drugs which, better than any others, are adapted to this end, viz: Tartar emetic, opium, calomel. Tartar emetic in small doses excites abundant secretion of the gastric and intestinal glandular apparatus. Alvine dejections become more frequent and more fluid, consisting at first of liquified feces, then a colored liquid in which are present biliary matter and some feces, and finally a whitish liquid resembling the rice water discharge of cholera. The drug also relaxes spasm. Opium allays pain and relaxes spasm, or more correctly it allays the pain by relaxing spasm. Calomel has a specific action on inflammation of serous membranes where the tendency is to fibrinous exudation, when the drug is given to the point of producing mild specific action. As I have more than once heard Dr. G. C. E. Weber remark regarding puerperal peritonitis, "I observed that where I could salivate them they got well."

The treatment by small doses of mercury given with the view of producing salivation and the use of small doses of opium and tartar emetic, given so as to produce alleviation of pain and free and abundant exudation from the intestines, and given in small and frequently repeated doses, so as to obtain the effect with the

minimum amount of drug, I regard as the very best treatment. I agree with those who object to giving it in large doses. It is only necessary to give opium in sufficient amount to relieve pain to such a degree as to render it tolerable, and this plan will be followed in two or three days by a large dark, tarry passage, and with the on-coming of that passage you will find a disappearance of tenderness, pain gone, and the patient convalescing in a very large number of cases. Besides this, my own practice has been to begin the use of salines first by free enemas the moment that the exhibition of mercury and tartar emetic produced the first symptoms of mild ptyalism. It has seemed to me that so many cases that I have seen have been accompanied by fecal impaction at one or the other end of the colon, that free use of salines by the mouth have too much of a tendency to drive a quantity of liquid fecal matter by no means aseptic, against the impaction and thus causing too much strain on the inflamed gut, and a possibility of perforation, so I have been accustomed to make the first attack on the impaction from below. I have, moreover, been wont to use hot applications, preferably the hot water bag. Where, however, hot applications do not appear to relieve I use the ice pack. Leaving the symptoms requiring operation to be spoken of under another head I will say that in cases where the pathology is as I have indicated, you will find that the use of small doses of mercury, tartar emetic and opium frequently repeated very often is all that is necessary to relieve the pain within a short time. You will not find sudden stoppage of the pain but an easing down of pain and of inflammation, after which the lumen of the appendix will again become open, the appendix will discharge its contents into the caput coli and the attack is practically over. I have a number of cases in my note books of recovery under this form of treatment. Now, however, I tell the patient that when he gets ready to part with that appendix I am ready to take it out, leaving him to decide whether he wants to risk a recurrence or not. By this means I hold my patient, for, if you do not offer to operate a case it very likely goes to the fellow who will. Some twenty years ago a business man of this town was taken with all the classical symptoms of appendicitis and I was called. Dr. B. W. Holliday was called with me. The man was quite ill, had an induration in the side, was treated as outlined, and recovered in two weeks. He has been in business ever since and has been perfectly well, never having a recurrent attack. Another case of which I have the notes here was that of a patient who had first a

slight attack with the classical symptoms who also recovered under the same treatment; eight years ago he had another attack, not very severe, keeping him in the house about a week; six years ago another attack occurred lasting three or four days; four years ago he had another more persistent attack, but at no time were the symptoms severe enough to necessitate operation. He was treated in the same way—recovered, and since then he has had on other attack. The other day I had him on my table and raked my fingers over his appendix as Dr. Parker has suggested and there was not a bit of tenderness to be elicited. I could report a number of other cases of which this line of treatment was used and recovery followed with no recurrent attack, so I maintain that even if we have symptoms of appendicitis it is worth while to spend some little time in finding out whether we have merely a simple catarrhal appendicitis or an appendicitis requiring operation unless, indeed, the indications for immediate operaton are urgent.

WHEN SHALL WE OPERATE?

BY FRANK E. BUNTS, M. D.

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I presume that in selecting this subject for my part of the program the President had in view the fact that in the present state of medical opinion it is absolutely impossible to lay down any rule which will be, or perhaps ought to be, followed by the profession. Such a rule is not yet and probably never will be formulated. Yet it is a matter for congratulation that we are able to see a little light in the chaos of opinion and find that after all we are not so far apart as some would have us believe. It has occurred to me sometimes that some of us are not absolutely sincere in our statements of our position. Some say operate in every case without any qualifications and I am sure they do not do it. Others are opposed to all operations and so express themselves, and yet I am sure there are cases where even they will consent to or urge an operation, and among those who fancy that they have a definite rule by which they decide to operate or not to operate, I am sure it is not so much the rule as it is an indefinable impression gained from experience which oftentimes settles the question as to when they shall operate. It is possible to divide the cases of appendicitis into a group of classes each of which, perhaps, deserves a separate consideration.

1. Cases recognized as appendicitis at their inception of moderate severity of symptoms.

2. Cases recognized as appendicitis at inception and characterized by great intensity of symptoms.

3. Cases not recognized as appendicitis until several days have elapsed, symptoms then becoming pronounced.

4. Cases recognized as appendicitis in which the surgeon is not called until the symptoms have begun to abate as indicated by diminution of pain, temperature, and pulse rate.

5. Cases in which delay has resulted in general peritonitis or septicemia.

This classification though essentially arbitrary seems to me to be a fairly practical one, at least it is one that shapes itself in my mind as I examine a case of appendicitis, and since I realize that each operator has his own peculiar views regarding the question of operation I shall not attempt in any way to make their views harmonize or to present them for your consideration but rather add my own views, so far as it is possible for me to formulate them, to what has already been written.

1. Cases recognized as appendicitis at their inception and of moderate severity of symptoms. These cases are most elusive and deceptive. It must be clearly recognized from the start that however mild may be the onset there can be no possible way of telling when the case may become alarming and no physician or surgeon can tell more than one totally out of the realms of medicine when an appendix may rupture. A few days or a few hours may be sufficient to determine gangrene of the appendix.

I believe it is in this class more than any other that the physician and surgeon differ. Realizing fully the responsibility attached to an opinion in these cases I believe that if the conditions for operation, that is the surroundings, assistants, and operator, are favorable, immediate operation will result in the greatest number of cures. Personally, I cannot recall a case in a series now becoming somewhat extensive, when under such circumstances I have lost a patient. On the other hand I am sure from an examination of the appendices removed that while some of them would undoubtedly have gone on to recovery, perhaps never to recur again, some of them were already at the point of gangrene, or of rupture, or were filled with concretions or pus which foretold a severe or fatal attack if left alone.

There is one consideration, I am sure, which has contributed not a little to the desire on the part of the attending physician to delay the operation and that is the belief that if the patient recovers it is much better to operate between attacks. It is to be re-

gretted that this belief should have received the wide credence which it has, for it certainly has been a stumbling block of no small magnitude. I believe that any case of appendicitis can be operated upon at the beginning of an attack quite as successfully, indeed, often more successfully than between attacks and if it resolves itself into a question of operating at the beginning of an attack, and between attacks, then the former should be chosen. Why? (1) Because no one can positively say whether the patient will live through the present attack. (2) Because each succeeding attack when completed leaves the appendix, by reasons of adhesions, lymph deposits and increased abnormal relations, in a more unfavorable condition for operation. I feel very strongly that this fact cannot be too strongly emphasized and the sooner the glamour of operating between attacks and its fancied ease are removed the greater will be the safety of the patient. Suppose that in a case under this group the consent of the patient or of the attending physician cannot be obtained for an operation, is there any way in which we can follow the case and give a reasonable estimate as to its progress? In many cases, yes. In some cases, no. Some will change so rapidly for the worse that the patient will be beyond the reach of surgical or medical aid in a few hours. In the less acute and more favorable cases, however, we can follow the progression in most instances very accurately and intelligently by means of the white blood count. An increasing leukocytosis in appendicitis is, I believe, sufficient evidence of increased inflammation and probable pus formation, to justify the urging of an operation, while a stationary white blood count will almost certainly indicate the subsidence of the inflammation and a favorable outcome may be almost safely predicted. To variations of temperature I attach but little importance, but an increasing pulse rate is a matter of serious moment and deserves careful consideration, for it is probably the early indicator of septic intoxication or possibly of septic infection.

2. Cases characterized by great urgency and intensity of symptoms. In these cases I believe great pain to be the most characteristic and important symptom and I have no hesitation in saying that they should be operated upon at the earliest possible moment, and fortunately for the patient his acute suffering usually persuades him of itself not to delay in acquiescing to an operation. It is folly to wait under any pretext in these cases. It goes without saying, of course, that some might get well of themselves, but the very intensity of the symptoms leads us to fear rapid progress

and perforation may take place too early for nature in her conservative efforts to wall off the diseased appendage and permit general peritoneal infection.

3. Cases not recognized as appendicitis until several days have elapsed, symptoms then becoming pronounced. Even in these cases, it seems to me that operation is indicated, though it may not be so urgently demanded. The time which has already elapsed will probably have been sufficient to wall off the appendix and prevent the spread of infection and when strenuous objection is urged by the patient or the attending physician, it may be considered reasonably safe to wait long enough to determine by means of the white blood count whether the inflammation is progressing or diminishing. If the former, operate; if the latter, delay is under such circumstances permissible.

4. Cases recognized as appendicitis but which the surgeon does not see until the symptoms have begun to abate as indicated by diminution of pain, temperature and pulse rate. This class of cases is not infrequent and I recall at least five such in the past year in which I have advised against immediate operation and recovery followed in each. Why not urge operation in all these attacks? Why wait and operate between attacks? First, because the advantages of an immediate operation, absence of adhesions, etc., are lost. Second, because the patient's general condition is lowered and a few weeks of convalescence and recuperation will put him in a better condition to withstand the slight shock of operation. Would I operate in all these cases that had been allowed to reach the stage known as between attacks? No. What then governs my position? As near as I can formulate it, it is this. If the preceding attacks have been severe ones, I urge it. If the patient expects to travel or go away to school, or otherwise put himself in a position where immediate aid under favorable surroundings might not be secured I urge it. If the patient is not sufficiently intelligent to appreciate the importance of the condition and feels that because he has gone through one attack he will safely go through another, I urge it. But if the patient be intelligent, if his circumstances be such that he can obtain medical aid at any moment and if he will agree that at the first onset of the disease he will submit to an operation, then I do not insist upon an operation between attacks. Why? First, because he may never have another. Second, because the next attack is readily recognized and the diagnosis made very early. Third, because an immediate oper-

ation is in my opinion practically as safe and as easy as one between attacks.

5. Cases in which delay has resulted in general peritonitis or septicemia. What must the surgeon say in answer to an appeal that he operate in these cases; an operation of last resort, "the only chance for the patient." Well, if he were to answer according to his wishes, according to the best interests of his reputation and his disinclination to shoulder a responsibility that belongs elsewhere, I believe he would resolutely say, no. I must confess that I have been greatly tempted to take the position advocated by one of America's greatest surgeons at the recent meeting of the American Medical Association and say that these cases, so unfavorable in their outcome, so sure to die, that operation is hopeless and that the operator gets the credit of killing the patient and undeserved discredit is insensibly cast upon a conservative operation, for unfortunately, even yet to the average person out of the medical profession, appendicitis, grave or mild, is still appendicitis and the last thing done is the cause of death.

OPERATION IN THE INTERVAL.

BY N. STONE SCOTT, A. M., M. D.

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The topic of interval operations, which has been assigned to me, I judge from the program, is intended to include all of those cases which are not operated during the febrile or convalescent period of acute appendicitis. I shall therefore divide the subject into operations following acute appendicitis and operations for so-called chronic appendicitis.

At the present time the laity have such a good understanding of appendicitis that one of their first questions after they are sure of recovery is, will I have another attack? and if I have another attack how soon and how hard will it be? and not infrequently will they ask, must I have an operation? Time forbids my going into statistics or any lengthy discussion of the pros and cons; I shall at this time simply state my convictions. It is certainly a fact that many cases who have had an acute appendicitis will have another attack, numerous writers upon this subject placing the liability to

such second attack as high as 80 or 90 per cent. There seems to be no doubt that there are many cases of acute appendicitis which are not followed by a second attack either at a recent or remote date.

Shall we advise all who have had one attack to submit to an appendectomy? In my own practice I do not do it. What then shall constitute sufficient grounds for advising an operation? A second severe attack is good and sufficient reason for submitting to an operation, at the beginning if seen early, or after the patient is convalescent if he can be tided over this second illness. Repeated slight attacks also are frequently the forerunners of a severe illness and should be a warning. Failure of the appendix to recover itself in a reasonable time after a severe attack is a good and sufficient reason for its removal. Every case of acute appendicitis which does not make a satisfactory and rapid recovery should have the appendix removed. If we do our full duty we will advise every case which has passed through a severe attack to present himself for examination at intervals even after convalescence is well established, and if the appendix remains enlarged or tender the patient is running great risk of another acute attack.

Chronic appendicitis is a subject which at the hands of both the specialist and general practitioner has not received the attention which it merits. Many of the laity and, I am sorry to say, some of the profession view the subject of chronic appendicitis, indeed some include even acute, as a fad, and the unfortunate sufferer as possessed not necessarily of a diseased appendix, but rather of a diseased imagination. Sometime since when I was called to see a case of acute appendicitis of three weeks' standing which had resulted in intestinal obstruction, one of the older men in the profession remarked upon the subject of chronic appendicitis that he thought any case which could be operated through a little bit of an incision was not bad enough to need operation at all, and appealed to me to confirm his decision. I hardly felt like upholding his view since my perverted imagination has made me thoroughly convinced that I have been decidedly improved since having one of the small incisions placed upon my own abdomen.

The importance of chronic appendicitis lies in two facts: First, that many of the cases with simply a mild amount of "mutterings of the appendix" are forerunners of acute severe attacks; second, that chronic appendicitis gradually and insidiously undermines the health and thus lays the foundation for some serious intercurrent disease. The most characteristic feature of this form of

appendicitis, as well as of the acute, is its treacherousness. One has no assurance that because he has had two or three slight attacks, or even twenty or fifty, that his next one will be slight; it may be an acute gangrenous appendicitis with early perforation or rapid extension of inflammation.

The diagnosis of chronic appendicitis when it follows an acute attack is reasonably easy; but when it comes on slowly and insidiously the diagnosis is at times exceedingly difficult, because the main symptoms are only indirectly referable to the appendix, and the disease is thus masked. So it happens that many of these cases are treated for months and years as stomach, liver, or kidney cases, or even possibly for lung or heart troubles, or malaria, and many of them are in the hands of the neurologist for some obscure nervous disease. As illustrative of my statement I would cite the fact that two cases of appendicitis within the last few years have been referred to me as stomach cases for gastro-enterostomy, in which removal of the appendix has cured the stomach symptoms.

The symptoms of chronic appendicitis are many and varied; pain is an unimportant one not characterized by being located in the region of the appendix, some even have the most intense pain upon the left side, and many more have pain in the stomach, so that pain of itself is apt to be misleading. Not that the patient does not have pain in the appendix region, but it is frequently overshadowed by pain in some other place. The pain in the appendix region is usually of a dull aching character and can be intensified by pressure upon the appendix. Sensitiveness of the appendix, however, is a sign of great importance, and must be sought for by an intelligent examination in order to be elicited. Stomach symptoms play a very prominent part; vomiting is very rare in chronic appendicitis at any stage; the symptoms are those of indigestion associated with gas, heartburn, and a stomach sensitive to pressure. As a result of these digestive disturbances auto-intoxication symptoms are also present, headache, sleeplessness, rapid and feeble pulse which is sometimes intermittent, bowels usually costive but not infrequently a subacute attack is ushered in by diarrhœa.

The physical examination in chronic appendicitis is of the first importance in establishing a diagnosis, which can usually be made with each if the examination be carefully carried out according to Edebohl's method. Every case of chronic abdominal disease, whether the main symptoms seem to be referable to the

stomach, kidneys, bowels, or generative organs, should have a careful examination for the condition of the appendix. But how easy it is to neglect to make a proper examination. We examined the patient some time ago, we are in a hurry, it is too much trouble or too distasteful to the patient to prepare for a thorough examination; so on one pretext or another we do not examine, and after our patient has become tired of our tinkering some other doctor gets the credit of finding out what is the matter. The examination should be made for position, relation of other organs, length and shape, but especially for increase in thickness or sensitiveness. If the appendix is found thickened or tender it should be examined frequently, and, if the acute exacerbations of the general symptoms are associated with an increased tenderness of the appendix, it is more than a probability that chronic appendicitis is largely responsible for the symptoms. The sensations of the patient, while the examination is being made for chronic appendicitis, are of the greatest importance, as he can tell with great accuracy when the appendix is being pressed upon. It must not be forgotten, however, that a normal appendix is slightly more sensitive than the colon or small intestine, though this hypersensitiveness is only slight. Usually the appendix can be palpated and the increased thickness of the organ detected by the sense of touch. When it cannot be distinctly felt and the sensations of the patient must be relied upon, repeated examinations become necessary in order to determine the fact that the appendix is more tender whenever the general symptoms are worse. It is then not a question as to whether there be anything the matter with the patient, that is settled by the general symptoms, but what is the matter.

Chronic appendicitis is often a sequel of other diseases, notably of floating kidney and tubal disease of the right side. Not infrequently will the tubal disease recover and the other difficulty be left to harrass the patient. It is in this class of cases that a differential diagnosis is not only difficult to make, but is of the first importance. Repeated careful bi-manual examinations may be required to disclose the condition of the ovaries and appendix.

It is in operations for chronic appendicitis that the on-looker supposes he sees the surgeon remove a normal appendix. In fact it is only when the appendix is properly prepared and examined that the true condition is shown. Many of these cases have all the pathological manifestations confined within the appendix, so that the external appearance is normal even on close inspection of the appendix as a gross specimen. If the appendix be cut open the

mucous membrane rolls out and over the cut peritoneal edges, the hypertrophy of mucous membrane and connective tissue is much more manifest. If the appendix be hardened and then cut it will be found that the lumen of the appendix is choked by the hyperplasia of the mucous and submucous tissues.

Finally, the proof that these appendices, which appear normal when first removed, are in a diseased condition, lies in the fact that the cases have the clinical symptoms of appendicitis and are entirely and permanently relieved by operation.

The treatment which is of most service for chronic appendicitis and is attended by least danger is appendectomy. This, if done in an aseptic and proper manner, with the patient in good general and local condition, is without danger.

OPERATION DURING THE ATTACK.

BY GEORGE W. CRILE, M. D.

Anesthetic. Chloroform, being attended by less struggling and followed by less vomiting, was more frequently given than ether. In cases in which the vaso-motor mechanism was seriously impaired either, on account of its lesser paralyzing effect upon this mechanism, was given. In two cases cocain was used, both were in extremis, and with large abscesses.

Therapeutics. For combating the toxic effects of sepsis, alcoholics and strychnia were employed. Alcohol in the form of whiskey, or iced champagne. In treating shock or sepsis saline solutions were added, either by hypodermoclysis in moderate cases, or intravenously, if severe. In the cases in which the heart was arhythmic fluid extract of digitalis was given. The administration of any stimulant during operation was the exception. Experience and experimentation have shown that it is better to wait until an indication develops. The additional energy consumed in consequence of the stimulation should be spared to help the patient through the operation.

Should a patient be removed to a hospital during the attack? If the infective inflammation is limited to the appendix, yes; otherwise, no. The necessary handling is likely to spread the infection. A trained nurse can do much toward overcoming the deficiencies of a house.

Technique. An incision parallel with the fibres of the fascia of the external oblique and near Poupart's ligament, I have found most generally useful. The abdominal wall is thicker in this re-

gion, drainage may be made in a more dependent position and the infected area may be approached from a safer angle. This, of course, applies to cases in which the infection has gone beyond the appendix. If limited to the appendix the intermuscular method with the incision anywhere external to the border of the rectus muscle, over the most probable location of the appendix, is most useful. If there is a mass, the incision should be made just external to the most prominent point. The thicker the muscular wall severed the less will be the probability of hernia. The location of the abscess may demand the incision in the median line, the left side, through the cul-de-sac, in the loin, in the right hypochondriac, in fact in any part of the lower abdomen. Operations in the attack require ample incision for making the intra-abdominal technique. The importance of selecting the most advantageous point in opening the abscess cavity cannot be overestimated. I have usually carried the dissection down at the outer side of the mass, making the opening at the best point for drainage and the most accessible for directing the operation. It is generally possible to enter the abscess cavity without separating the adhesions at any point. As the pus escapes it is washed away with sterile water poured from a pitcher, the stream being directed into the abscess cavity which may be held open by means of retractors and the fingers. Gravity favors the formation of secondary abscess in the pelvis and rather frequently a small one may be in the fossa, with a large one wholly separated lower in the pelvis. Great care is needed on the part of assistants in making retraction, as the blades of retractors so easily break down the adhesions. It is very rare when the appendix may not be removed. In a series of 209 operations it was removed in all but 7. In the abscess cases I do not attempt to bring the appendix and the caput coli up but sever it where it is found, often not even applying a ligature to the stump. Small full curved needles and a long, slender needle holder enable the operator to suture the bleeding points in the cavity. If the opening be sufficiently wide and advantageously placed the abscess cavity may be inspected. This with digital exploration usually discloses the appendix, which in almost every instance forms a part of the abscess wall. Fortunately there are usually adhesions beyond the appendix. If the appendix is severed in its position there is but little danger of extending the infection, as it is literally cut away *in situ* from the wall. Since exercising extreme care in not manipulating the caput coli, in not trying to invert the appendix and in not even disturbing it from its

position, I have rarely had fecal fistula follow. I would lay great stress upon cutting the appendix free, instead of using blunt dissection. Drainage need practically never be employed in cases in which the infection is limited to the appendix.

Bacteriological examination may prove that many of the older abscesses are sterile, yet this cannot be determined at the time of operation with sufficient accuracy to warrant immediate closure as in a case of old pyosalpinx.

One of the most important points in the technique of cases of abscess is the provision for drainage. In cases in which the abscess is walled off, that is to say the peritoneum has overcome the tendency to invasion, but little drainage is necessary, but in the more virulent cases correspondingly increased drainage is required. In other words, provision for drainage should be proportional to the virulence of the bacteria rather than to the amount of the pus. Glass drain tubes are too rigid and, together with rubber elastic and other forms of tubular drainage, tend to produce pressure necrosis. At all events this form of drainage is more of a well than a drain, sort of a gauge showing how full of fluid the cavity is. Dry gauze or wick drains tend to become plugs that effectually prevent drainage, while moist gauze drains cut off at or near a level with the surface of the wound, drain only until their own meshes have acquired a capillary saturation, which is at best but a limited drainage. But if the gauze drains are made long enough to extend well down over the side and placed in contact with a mass of dry absorbent cotton, continuous capillary drainage occurs as shown by the amount of fluid collected. In every case of drainage a hot water bag is applied from the beginning to the end. In every drainage case moist bichloride dressings, 1-10,000, are applied upon the wound and the drains. If the abscess is sterile the antiseptic will at least prevent infection and lessen suppuration. If the abscess be not sterile then antiseptics are indicated. A 1-10,000 bichloride solution applied upon the outer dressings from which it may find its way by capillarity through the gauze drains into the infected area has been extremely satisfactory.

The cases recently perforated and in which an abscess has not yet formed demand a different technique. While in abscess cases the appendix is cut away in its bed, and the caecum is not disturbed, in this class the appendix, and if necessary the caput coli, should be delivered so that the manipulation incident to its removal may be made upon a bed of gauze and the appendix itself wrapped in gauze. Only in cases in which the appendix cannot be

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brought up into the wound is it advisable to pack the cavity off with gauze. The technique for removal of the appendix while the infective inflammation is still limited to it consists in opening the abdomen by the inter-muscular method, in catching up the meso-appendix by means of a running stitch of catgut, in severing the meso-appendix, in inserting a purse string stitch in the caput coli around the base of the appendix, in making a circular incision through the peritoneal coat of the appendix half an inch from the base, in severing the remainder of the appendix at or near a level with the caput coli, in then inverting this peritoneal stump of the appendix and appendicular base into the caput coli as the purse string is drawn, thus disposing of the remnants of the appendix without the formation of a pedicle and leaving nothing but a peritoneal dimple to mark its former place. The abdominal wound may be closed with a single strang of catgut, layer by layer, a subcutaneous stitch closing the skin.

ANALYSIS OF STATISTICS.

Males	about 60 per cent.
Females	about 40 per cent.
Average age males	25 years
Average age females	30 years
Oldest	64 years
Youngest	4 years

About 30 per cent. of the appendices were in the pelvis; twelve were associated with disease of the right ovary or tube; one was adherent to the fundus uteri; in seven the appendix was not found.

About 75 per cent. had had previous attacks. In five, fecal fistula followed operation, in one of which it became necessary to resect the small intestine to effect a cure.

For the purpose of discussion the operations are arranged in the following groups:

	Cases.	Deaths.	
1. Operations in the interval and chronic appendicitis	42	0	0
2. In acute attack with involvement of the appendix only	30	0	0
3. In acute attack with localized infective inflammation and abscess	113	2	2 %
4. In acute attack with diffuse abscess and general peritonitis	24	12	50 %

Total number of operations, 209; deaths, 14; making a death rate of 6.7 per cent.

COMPLICATIONS DURING APPENDICITIS.

BY MORRIS D. STEPP, M. D.

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According to most later authors appendicitis is divided into the simple catarrhal and the ulcerative form. All digressions from these two original subdivisions must be regarded as complications. First of all may be considered the frequent change from the catarrhal into the ulcerative form. This happens in almost all cases of recurrent appendicitis at some time or another, if left to themselves, followed by the clinically more important form of perforation. Although the ulcerative form generally makes itself manifest in the production of all the usual symptoms, many cases have been observed and reported in which they were absent entirely or so insignificant as to be out of all proportion to the gravity of the lesion. Osler reports eleven instances occurring in typhoid and phthisis with no clinical indication whatever. Ulcerations if not a complication of the catarrhal form result from the presence of foreign bodies or foecal concretions, distention of the lumen with fluid, tortion of the appendicular artery or from direct infection. Nature's effort to combat the pathological changes becomes evident usually before perforation has occurred, inasmuch as a localized peritonitis follows in the region of the appendix and adhesions have enveloped it entirely or at least protected it at the points where the greatest changes were taking place.

Should perforation then take place the disturbance might be only slight and followed by resolution, or it might go on to the formation of a circumscribed abscess cavity. Dependent upon the position of the appendix, the coincidental formation of adhesions or the direction of least resistance, this abscess may be either intra or extra peritoneal, pericaecal, pelvic, perinephritic, lumbar, hepatic and even penetrate into the pleural cavity. As will be readily seen a vast number of complications arise in these instances and all according to the position of the abscess cavity. The function of any organ which becomes involved in this destructive process would be either partially or entirely destroyed.

Although not common, it has been frequently observed when the abscess cavity is situated high up, that we have, added to our usual symptoms a high grade of icterus due in most instances of course, to pressure upon the billiary passages, but in others to an invasion of the liver substance itself. In the case of the kidney,

pyelonephritis is by no means rare, and that the right ureter is not more commonly involved must be due to the fact that the constant flow of urin tends to keep its lumen open. Should the appendix have the so-called retrocolonic position, the resulting abscess would be extra peritoneal and might follow beneath the sheath of the iliacus fascia and make its way into the neighborhood of Poupart's ligament where external perforation and recovery have occurred. If the retroperitoneal tissues of the flank are involved a perinephritic abscess results, reaching in this instance immense proportions. In a case under the care of Gardner of Montreal it displaced the diaphragm to the second rib and containing air it produced symptoms of pneumothorax. Faecal pleural fistulæ are also reported following retroperitoneal abscesses.

Perforations into the bladder have occurred repeatedly, both when the abscess was extra peritoneal or when intra peritoneal, and cases are reported where the cavity has extended along the psoas muscle, penetrating to the hip joint or to the rectum, perineum or scrotum. A large gluteal abscess has been known to follow the burrowing of pus through the obturator foramen. Perforation into the bowel is more common than perforation into the bladder and adds to the list of complications that of hemorrhage. Intestinal hemorrhages causing death have occurred in appendicitis with the same rapidity that is seen in the most virulent form of typhoid and should be remembered when taking into consideration the medical treatment of this disease. Hemorrhage from the appendicular artery during the course of the disease is of very rare occurrence on account of the usual, early adhesions and the aglutination power of the exudate. Where a large portion of the caecum has been involved in a circumscribed abscess, the appendix has sloughed off and passed per anum. In perforative appendicitis adhesions are the rule, yet this depends to a certain extent upon the virulency of the infection or the rapidity of perforation in an already, oftentimes damaged appendix. The latter may, therefore, after perforation has been established, hang loosely within the peritoneal cavity without the intervention of any profilactic wall which would guard against the continuance of infection. In this case we should have to deal with that gravest of all complications, suppurative peritonitis which opens the way for metastatic abscesses in any part of the body or for a general systemic intoxication. A general, simple, inflammatory peritonitis may develop by extention from a localized area and from which the patient may, and very often does recover, but the suppurative form

of peritonitis usually proves fatal and especially so in children.

Endocarditis in the course of an appendicitis is due to the introduction into the heart of septic emboli containing micro organisms identical with those found at the seat of the original infection and follows usually a septic peritonitis or circumscribed abscess of the appendix. Through the elimination of toxic materials and for the same reason that endocarditis occurs, do we occasionally come across a septic nephritis with all its attendant symptoms. The sudden secession of pain with or without lowering of temperature should always call attention to the possibility of gangrene brought about, either through the pressure of fluid confined within the lumen of the appendix, one or more faecal concretions or strictures, or by compression or torsion of the appendicular artery. Both in the onset and during the course of the disease constipation oftentimes amounting to an impaction is common.

This is due in all probability to an inflammatory involvement of the intestine or to an impairment of the nervous mechanism supplying the power of peristalsis. Probably the most frequent cause of intestinal obstruction is the formation of bands of adhesions which sometimes rapidly close the lumen of the intestine or in other instances not until contraction following the termination of inflammation takes place. Phlebitis in one or the other extremity with thrombosis of the iliac or femoral vein is quite frequently noticed and may occur during the course of the disease, but is more usually seen after an operation. No good reason has been ascribed for this, since it may follow an aseptic operation in the quiescent stage and occurs as frequently upon the left as upon the right side.

APPENDICITIS AND TYPHOID FEVER.

BY CHARLES J. ALDRICH, M. D.,

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It is quite certain that typhoid fever bears an etiological relation to appendicitis. Keen (1) seems to be impressed with this fact, but does not advance any evidence to support the contention. Deaver (2) says, "I believe typhoid fever to be one of the remote

causes in the production of appendicitis." Hare (3) says, "In all probability typhoid fever predisposes a patient to appendicitis." Rolleston (4) found changes in the appendices of fourteen out of sixty cases of enteric fever seen in St. George's Hospital, London; in two there was perforation, in seven ulceration and in five tumefaction. Hopfenhausen (5) observed and studied the appendices found in thirty cases of typhoid fever and concluded from their study that changes in typhoidal appendices are always present. These changes are most marked in the earlier stages of the fever and consist chiefly in cellular infiltration. She believes that specific typhoidal ulceration is rare and usually insufficient to produce a severe form of appendicular disease. The same observer (6) found eight cases of perforation of the appendix in 808 cases of typhoid fever. In two of these cases a correct diagnosis was made before death; the third caused a perityphlitis which was found post mortem. From a continuation of her interesting investigations on the subject, we quote the following statistics (5) in regard to 743 cases of appendicitis, 37 of which were supposed to be caused by typhoid fever:

	No. of cases proceeding from typhoid fever.	No. of cases observed.
Hospial cantonal de Lausanne	9	200
Sonnenburg	6	130
Pozzi	1	1
Bull	3	12
Hecker	1	35
Bossard	2	26
Douneff	4	52
Le Guern	1	110
Jacobson	2	6
Schnellen	1	32
Langheld	4	112
Hohn	1	2
Jacob	2	25
Total	37	743

Careful study of these statistics throws considerable doubt upon their value in establishing the relationship.

The appendix contains solitary glands which may become diseased from typhoidal infection and produce any grade of specific change, from congestion to perforation. The healing of these ulcers may cause cicatrical contraction and thus close or narrow the lumen of the appendix, which favors the development of future disease. It is also well known that the appendix contains

considerable lymphoid tissue which is particularly susceptible of typhoidal infection and inflammation. The irritative processes set up by such changes as described by Hopfenhausen and referred to in the preceding sentences, may continue and develop a chronic appendicitis. Such cases have been reported, and as we study the question more closely will undoubtedly multiply.

The extreme paucity of the literature on the subject of disease of the appendix in typhoid fever is probably due to the fact that the organ has been neglected and not examined for specific lesions while making autopsies on those dying from typhoid fever. Keen (7) declared that every operator, while operating for intestinal perforation in typhoid fever, should never fail to examine the appendix and remove it if diseased. In his table of operations done for typhoidal perforation of the bowel, perforative lesion of the appendix is stated to have been found by Bontecou (8), Kimura (9) and Alexandroff (10). Fitz (11) has recently collected five cases of perforation of the appendix due to typhoid fever. Morin (12) found twelve cases of perforation of the appendix in sixty-seven cases of perforation of the bowel in typhoid fever; Heschl (13), eight appendicular perforations in fifty-six cases of typhoid fever.

Fitz and Hare have both remarked that perforation in typhoid fever in the appendicular region is more likely to be followed by recovery than if the perforation occurs elsewhere. Fitz has also asserted that when the symptoms of perforation closely resemble an appendicitis the prognosis is more favorable.

That typhoid ulcers occur in the appendix is certain, and it is quite possible that they occur more frequently than the literature leads us to believe. Stengel made a verbal report at the meeting of the Pathological Society of Philadelphia, of several instances in which typhoid ulcer has been found in the appendix. Sailer and Riseman also mentioned its occurrence in a case observed.

I feel that we are now in a position to make, with some degree of assurance, the following statements in reference to the relation of appendicitis and typhoid fever.

(1). Appendicitis may occur as an accidental complication of typhoid fever, and as such bears no other relation to the typhoidal infection.

(2). Appendicitis may occur during the course of typhoid fever and be caused by conditions engendered by both local and general infection by the bacillus of Eberth.

(3). Not a few of us meet with patients who are suddenly taken ill with symptoms unmistakably appendicular in character, but which gradually subside and are merged into a typical typhoid which then runs its usual course.

While the occurrence of an appendicitis in the course of typhoid fever, may be accidental or casual, yet it is the third condition mentioned which is most puzzling to the physician, and demands a great deal of care and a high order of skill to prevent him from falling into the lamentable error of advising an operation upon an appendix which is unfortunately situated near, and irritated by specific lesions in and about the head of the colon.

The following case will illustrate some of the difficulties in diagnosis as encountered in the third of the conditions referred to:

E. O., a slight fair-haired girl of nine years, was taken suddenly ill with a severe pain in the right iliac region which was accompanied by nausea and vomiting. The temperature was found to be 103½ degrees in the axilla and the pulse 120 to the minute. The patient lay with the knees drawn up, face flushed and tongue slightly coated. There was some general tenderness over the abdomen, but pressure over the cecum produced more decided pain and there seemed to be a slight rigidity of the muscles on that side. No defined mass could be felt, but resistance existed in the neighborhood of the appendix. Careful examination of the patient failed to make matters more clear and the persistent search for a cause of her illness lent to the family part of my own anxiety. Pressed for a diagnosis, I informed them that there were symptoms of appendicitis. A neighbor who had recently returned from a successful operation for appendicitis, and naturally impressed with the importance of an operation in all cases and at the earliest possible moment, caused the parents of the little girl to insist upon a consultation with a surgeon, and Dr. Parker was called seventy-two hours after the beginning of the attack.

About four hours preceding his visit a free movement of the bowels was secured and the little patient seemed to have lessened tenderness and fewer symptoms of appendicular inflammation. At this time some specimens of blood were taken, but were not examined until later. Dr. Parker was decidedly of the opinion that no appendicitis existed, although there was some tenderness still present in that region; neither did we strongly suspect typhoid fever. In fact, the bright eyes, the high temperature, rapid circulation and flushed cheeks of the little patient caused Dr. Parker to remark on the possibility of a beginning scarlet fever.

In a few days we had a development of rose spots and the case ran a typical and mild course of typhoid fever and recovered after about four weeks' illness. Examination of the specimens of blood which were taken at the time mentioned, did not give a reaction to the Widal test but revealed an absence of leukocytosis, which supported the opinion that it was not an appendicitis, and caused a suspicion of typhoid, although the spleen could not be palpated. One week later the agglutination test was marked.

In this class of cases the aid afforded by a careful blood examination may be of the utmost importance and should not be neglected, since in appendicitis we are quite sure to find an increase of leukocytes, while in typhoid fever the opposite condition obtains. The Widal reaction is often met with quite early, and in those cases in which the history of a previous typhoid is not obtainable, its presence would be pivotal.

The second case which I will report was one of undoubted perforation in the region of the appendix in a patient who was sick with typhoid fever in the wards of the Cleveland General Hospital. Mr. L., with his wife and infant child, both of whom were very ill with typhoid fever, was sent to the hospital by Dr. Hobson of Flushing. The mother was attacked with typhoid on the sixth day following her accouchement and died on the twenty-sixth day of her disease. The infant after an illness of many weeks recovered. Mr. L., although supposed to be well, was found to have a temperature the night that his wife and child were admitted. His spleen was enlarged, tongue coated, and a diagnosis of typhoid fever was made. He ran a very uneventful course of fever until the twenty-first day, when he was suddenly seized with a very severe pain in the right iliac fossa, developed the scaphoid belly, abdominal rigidity, and yet he did not seem to suffer from the amount of collapse and prostration incident to perforation of the bowel. He was seen by several members of the staff and all coincided in the diagnosis of appendicitis or typhoid ulcer of the caput coli or of the appendix itself. Although his condition was very precarious it was not thought best to make an operation, and notwithstanding a number of doubtful days he gradually began to gain strength, his fever disappeared and he made a complete recovery. Although the extreme rigidity of the abdominal muscles prevented very accurate palpation of the appendicular region, a mass was clearly demonstrable. Since seeing this case I have had the privilege of observing another patient in the wards of the Cleveland General Hospital which was undoubtedly typhoid. His

wife while caring for him was stricken with the disease and was also in the wards of the hospital. During the course of his fever he began to complain of pain and tenderness in the right abdomen, a tumor developed, fluctuation appeared and an incision was made, evacuating a large quantity of pus whose odor testified to its intestinal origin. He made an uninterrupted recovery, bearing out Fitz's and Hare's dictum that a typhoid perforation in that region is more likely to be followed by recovery. The diagnoses of these cases were supported by all the facts and probabilities, yet they serve aptly to illustrate the saying of the witty Frenchman, "that no case is complete without a post-mortem."

I can conceive of no reason why the treatment of an appendicitis which exists as an accidental complication of typhoid fever should not be governed by the same principles observed in the treatment of a non-typhoidal patient. We are all aware that typhoid patients do not bear anesthesia and operation well, but when the abdominal cavity is threatened by a diseased appendix, the issue should be met and the offender removed. When, however, we have reason to believe that we have a typhoidal affection of the appendix occurring well along in the course of the fever, we should consider carefully the possibility of the symptoms—pain, tenderness, muscular resistance, scaphoid belly-wall and mass in the right iliac fossa—all being due to typhoidal ulceration of the cecum and about the iliocecal valve. If one is familiar with the beautiful colored drawing of typhoidal ulceration of this part of the intestinal tract which is shown in the "Atlas of Pathology," by Kast and Rumpler, he will readily understand why all of the so-called classical symptoms of appendicitis may occur without the appendix per se being implicated. Few surgeons would care to face the possibilities incident to deep ulceration and possible adhesion in this region of the gut. Best lean upon the observation, that perforations in this region are usually preceded by adhesions which may be followed by localized abscess and recovery. Since not a few cases of typhoid fever begin abruptly with rather violent bowel affection and considerable soreness and tenderness, most marked in the right iliac region, it follows that some of these cases will present a most difficult problem for both the attending physician and consulting surgeon. We learn by our mistakes, and having erred and grown wiser, I now believe it possible to make a differential diagnosis.

(1). Surgical Complications and Sequels of Typhoid Fever, p. 156.

(2). A Treatise on Appendicitis, p. 34.

(3). Medical Complications, Accidents and Sequels of Typhoid and Enteric Fever, p. 146.

(4). Lancet, 1898, vol. I, p. 1401.

(5). Revue Med. de la Suisse Romande, Feb. 20, 1899. Etude sur l'etat el l'appendice vermiforme, dans le cours de la fievre typhoide.

(6). Revue Med. de la Suisse Romande, Feb. 20, 1899.

(7). Surgical Complications and Sequels of Typhoid Fever, p. 231.

(8). Jour. Amer. Med. Assn., Jan. 28, 1888, p. 106.

(9). Sei-i-kwai Medical Journal, 1890, ix. 55.

(10). Report of Hospital St. Olga, in Moscow, 1890, p. 198.

(11). Trans. of Assn. of Amer. Phys., 1891.

(12). These de Paris, 1869.

(13). Schmidt's Jahrbucher, 1853, lxxx. p. 42.

APPENDICITIS IN CHILDREN.

BY JOSEPH V. KOFRON, M. D.

That the appendix vermiformis is often affected in children is evident from the fact that about 25 per cent. of all cases of appendicitis occur before the 15th year. While appendicitis is considered rare before the fourth year, it occurs in about 45 per cent. of the cases between the fourth and ninth year and about 50 per cent. between the tenth and fifteenth year.

It is much more common in the male than female, the average being about 70 per cent. males and 30 per cent. females.

I shall not dwell upon its anatomy except to mention that the appendix is found comparatively larger in the child than in the adult. It is also comparatively smaller, i. e. it is shorter, has a smaller caliber, has a greater blood supply in the female than in the male. Its position is very variable.

Etiology: The most prominent predisposing causes are: Age, sex, its variable position and blood supply and its size, also twists, kinks, and other anatomical peculiarities.

The most common exciting causes are: Lodgment of fecal matter, foreign substances such as pins, worms, seeds, and other material, traumatisms, typhoid fever, diarrhoea, indigestion and constipation.

The latter is thought to be a very frequent cause in children.

The bacillus most frequently found in appendiceal abscess is the bacillus coli communis and it is probably the prime factor in the production of appendicitis.

Children suffer from catarrhal, ulcerative or perforative appendicitis, and the most common termination is that in abscess, with general peritonitis second, and resolution last.

Recurrent attacks are probably not as frequent in children as in adults.

Symptoms and Diagnosis: Pain, vomiting, diarrhoea or constipation, fever, rapid pulse, resistance of the recti, localized tenderness, tympanitis, respiratory difficulty and sometimes dullness on percussion localized in the right lower abdominal quadrant are the symptoms most commonly present.

Pain is a very constant symptom, and it is usually described as sharp, dull or aching; it is paroxysmal in character and quite persistent. Pain sometimes comes very early in the attack and may be very sharp but gradually diminishes, or it comes on quite late and increases in severity and frequency. While pain may be referred to any part of the abdomen it is usually directed to the lower half and (especially if attention has been called to it) the right lower abdominal quadrant. It must be remembered that the character of the pain is no indication of the gravity of the attack and therefore it must be carefully considered along with the other symptoms.

Vomiting may sometimes be absent if there is diarrhoea, but it is usually present and is very complete, the stomach emptying itself without difficulty or retching. It may last only a short time, but is commonly quite persistent.

Constipation is much more frequent than diarrhoea and is sometimes very obstinate. Fever is usually present early in the attack and may reach to 105 degrees F., but usually it does not rise above 102 degrees F. It is very unreliable, as I have repeatedly seen severe attacks from the beginning and up to the time of operation go along with the temperature not raised above 100 degrees F. and again others considered mild attacks with the temperature raised to 104 or 105 degrees F.

While the pulse rate may remain normal or nearly so in some cases, it is found to be increased in the majority of the cases, especially at the onset.

Localized tenderness is usually present early and is one of the most important symptoms, especially if referred to the right

lower abdominal quadrant; it usually remains even when the patient is free from all the other symptoms, and it is occasionally the only symptom supporting our diagnosis.

Resistance of the right rectus, occasionally of both recti, if associated with the symptoms just enumerated, is one of the most suggestive symptoms.

Tympanitis, when present early, will hinder us from making a satisfactory examination, and I have occasionally seen cases where an abscess was easily made out when the tympanitis was relieved, but could not be made out before. It is most frequently present in cases with marked constipation or when peritonitis is present.

Respiratory embarrassment is usually seen when peritonitis and adhesions are present, and when hiccough accompanies it is a most positive sign of adhesions and means a desperate case.

Dullness in the right lower abdominal quadrant is seen when adhesions between the intestinal coils and their covering occurs in the region just mentioned or when an abscess is present.

To recapitulate: Pain, vomiting, constipation, resistance of the rectus with localized tenderness and dullness in the right iliac region are the most common and probably the most reliable symptoms we have.

Differential diagnosis: The differential diagnosis in children is between colic, indigestion, intussusception, typhoid fever and psoitis.

Colic is usually distinguished by the absence of fever, the pain in colic being referred to the region of the umbilicus and is usually relieved by mild, persistent pressure, while pressure in appendicitis will increase the pain.

Indigestion in children is usually accompanied by high fever, the pain is generally referred to the epigastrium and diarrhoea is more frequently present than constipation, while the opposite is the rule in appendicitis.

While intussusception is usually accompanied with pain, vomiting and colic, there are also present tenesmus and bloody stools, no fever at onset and when a tumor is present it is usually on the left side. Typhoid fever may be mistaken at the onset, but the history epistaxis, coated tongue, headache, characteristic rise and fall of temperature, rose spots and often nervous symptoms will help to distinguish.

Psoitis: In psoitis there is usually some retraction of the lower limb, the general symptoms of appendicitis are absent, and it is rarely seen as compared with appendicitis.

Prognosis: The mortality is high, by some writers given as high as 45 per cent. General peritonitis being the cause of death in the great majority of cases, with pyemia second.

The treatment does not differ from that in the adult.

APPENDICITIS AND PELVIC DISEASES.

BY R. E. SKEEL, M. D.

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That appendicitis and disease of the pelvic organs occasionally co-exist is well known to all abdominal surgeons and although the relation existing between them has been investigated to a limited extent by Fowler and others, it has, so far as I know, never been thoroughly studied.

That a patient having pelvic disease should have an intercurrent attack of appendicitis or a patient with chronic appendicitis an attack of possible salpingitis, is no evidence that the same cause led to both inflammatory conditions, the two then being perfectly independent of each other. The interesting question is whether they are always thus independent or whether appendicitis may lead to destructive inflammation of the pelvic viscera or disease of the pelvic organs to actual disease of the appendix.

With the appendix in its ordinary location, hanging over the pelvic brim, the tip is but a short distance from the right tube and ovary and there can be no question that perforation of this portion of the appendix with its resulting peritonitis, whether strictly localized or spreading over the entire pelvic cavity, must lead to the infection of the peritoneal surfaces of these organs. Similarly the peritonitis accompanying salpingitis, ovarian abcess and other forms of acute and sub-acute pelvic disease must at times involve the peritoneal surface of the appendix as it does other portions of the intestinal canal. Such involvement of the appendix, however, is not appendicitis and is upon the wrong surface of that organ to lead to serious trouble.

On the other hand I have never personally observed or heard of a case in which appendicitis with its accompanying abscess formation or spreading inflammation has led to destruction of the ovary or even permanent occlusion of the fimbriated extremity of the tube. That such a result is possible cannot be gainsaid, however, as the open end of the tube invites septic contamination from the interior of the abdominal cavity. That it is rare is proven by

the fact that evacuation of abscess cavities and removal of the appendix results in almost certain and complete recovery, no complaint being heard of diseased uterine appendages after such an operation or even after spontaneous rupture and evacuation through the rectum. A considerable number of instances have been reported in which the appendix and tube or appendix and ovary or both have been fused in a common inflammatory mass and one marked example of that kind has come under my own observation. In such instances both organs have probably been removed without any effort being made to determine whether the removal of the one originally offending would have resulted in the resolution of the other. On purely clinical grounds I should be led to think that the instances in which appendicitis caused actual disease of the pelvic organs deeper than their peritoneal surfaces or vice versa must be extremely rare and that when a thickened tube and ovary involved in an inflammatory mass is found with appendicitis and caused by it, it is no more necessary to remove them than it is to resect a portion of the small intestine for the same reason. On the contrary an appendix involved in such a mass having its primary origin in the tube should be removed because it is a useless organ and may give rise to future trouble.

The most important consideration in the whole subject, however, is that of differential diagnosis, for salpingitis rarely needs operative intereference in the acute stage while appendicitis, to be extremely conservative, frequently does, and I know of no conditions in which accurate differentiation is under some circumstances and in the early stages more difficult. Of course salpingitis is not the only disease of the pelvic viscera which may lead to error; extra uterine gestation and puerperal lymphatic infection both sometimes being extremely misleading. Salpingitis is, however ,the most common and it is fortunate that it is so rare as a primary disease or differentation would be even more difficult than at present. Pelvic inflammation, the result of infectious disease of the tubes or ovaries, will ordinarily have been preceded by some suspicious evidence o fgonorrhea, a septic labor, or induced abortion. Gonorrheal inflammation of the tubes is sub-acute in character, is usually bilateral, pain in the early stages is confined to the pelvis and so soon as a mass can be detected its location ' characteristic.

Appendicitis is acute in onset, pain in the early stages, is epigastric rather than pelvic, and the well known point of tenderness

over the origin of the appendix is usually well marked. Muscular rigidity is marked in appendicitis, much less so in peritonitis from tubal disease.

Septic pelvic peritonitis with or without involvement of the ovary and tube usually follows in such close relation to its cause that one is not so apt to be misled. That mistakes are possible is shown by the following case: Mrs. Annie L., aet. 20, was delivered by a midwife in December, 1899. She did well for several days and then began to have pain in the abdomen with fever and sweats. When I first saw her the temperature fluctuated between 101 and 103 degrees, the pulse was from 110 to 130, abdomen distended, vomiting and constipation were marked. Examination showed the cervix well closed, the uterus not large, no foul lochial discharge althought it was rather free. No mass was to be detected in the pelvis. The case was considered to be one of lymphatic infection and was treated by the ice bag locally and strychnine and stimulants internally. No change occurring and the abdominal pain continuing an exploratory opening through the posterior vaginal cul de sac was made, but revealed absolutely nothing. Much to my surprise the patient improved for a few days but the temperature, rapid pulse and abdominal pain soon recurred. At this time the pain was localized over the right side, and rigid diet with free evacuation of the bowels had reduced the tympany until it was possible to make out localized resistance in the upper part of the right iliac fossa. Incision here revealed the trouble, a small appendical abscess with a ruptured appendix behind the caecum. Evacuation of the abscess and the removal of the appendix led to complete although slow convalescence.

Gangrenous appendicitis with subnormal temperature and shock can scarcely be mistaken for any pelvic lesion except ectopic gestation with rupture and the history in these latter cases will usually put one upon the right track, a missed or delayed menstrual period with colicky pelvic pain almost always preceding the evidences of active hemorrhage.

Finally chronic appendicitis must be differentiated from pelvic neuralgia, that form particularly associated with so-called cystic ovaries and in which removal of the ovaries makes the patient's life more miserable than before. A chronically diseased appendix is subject to recurrent attacks of inflammation with vomiting and slight elevation of temperature; it is very frequently palpable as a hard cord under the examining hand, excepting of course when turned up under the caecum and tenderness can rarely be elicited by vaginal examination.

In pelvic neuralgia on the contrary fever is never present, palpation reveals several instead of one tender point, and a matter of the greatest importance, pinching the abdominal wall during bi-manual examination gives rise to as much distress as actual pressure upon the tubes, ovaries or appendix.

The treatment to be accorded to acute appendicitis should be modified in no way by the co-existence of pelvic disease and that treatment has been described fully by abler pens than mine. It is sufficient here for me to say thata I believe every acute attack endangers life, that no man can say at the outset what attack is to be mild and what fatal, that consequently every case should be operated upon, *when the diagnosis is certain,* at as early an hour as possible, that this should be done in spite of the fact that over one-half will recover without operation and for the very good reason that the operation itself at an early date has almost no mortality rate. Of the cases which would die without operation a large proportion could be saved by early interference.

He would be a hardy operator indeed who would risk spreading septic mischief by operating upon chronic pelvic disease in the face of acute appendicitis either with or without abscess formation, but tubes and ovaries might be removed or resected as the case demanded and certainly should be so treated if the condition were discovered in the course of operation for chronic disease of the appendix.

SURGICAL INTERVENTION IN APPENDICITIS FROM THE PHYSICIAN'S STANDPOINT.

BY JOHN H. LOWMAN, M. D.

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"No patient is safe unless his appendix is in his pocket," Roux (of Lausanne) makes one of his confreres say. It is a droll way of putting the dictum of the radical thinkers on appendicitis, operate at all times, under all circumstances, as soon as possible. Opposed to this is the teaching of the conservatives;—operate in the interim, when operation is safe. Between these extreme opinions are the opportunists, who suit the treatment to the individual case.

When to call a surgeon, means when is surgical intervention necessary. To answer this one must define to himself his position on the treatment of this disease.

The most radical advocate of immediate intervention today is Dieulafoy. He has, during the last few years, won over to his ideas most of the surgeons and many of the physicians of Paris. He says, "There is no medical treatment of appendicitis. At the first cry of alarm it is already too late, the canal is obstructed, a cavity is closed, and the toxic infection is started."

According to his school, an appendix touched is an appendix condemned. There is no compromise, and operation must follow immediately in the wake of diagnosis.

On the other hand, the record of the operations made in the interim is so brilliant, that it is small wonder that many have been seduced to strive for it. Sonnenberg reports 131 operations in the interim, with no deaths; and this report is duplicated by others again and again, so that we can look upon operation at this time as almost absolutely safe. Operations in the acute stage rarely are better than 90 per cent. recoveries. It is, therefore, the hope of giving the patient the best chance that the operation is postponed.

But what happens by this temporizing? Full statistics of medical treatment of appendicitis are not accessible. Chauval reports 84 cases treated by classic medical measures, with a mortality of 30 per cent.

The question, then, is this:—with a medical diagnostician of great acumen, and a surgeon of marked ability, there will be a mortality of 10 per cent. for urgent operations, (made as soon as possible) whereas with medical means alone, there will be a mortality of 20 per cent. or 30 per cent. With operation in the interim, or "cold stage", there is practically no mortality.

The question can be further considered thus: Suppose we wait for the first signs of peritonitis or pus. In Chauval's statistics this was the rule in 81 cases, with a mortality of 31 per cent.; this rule is, then, a dangerous one.

There are many cases of appendicitis that recover without surgical intervention. Can these be prognosticated, or is it a matter of luck? This question is hedged about by so many incidents, that it is impossible to answer. I do not believe that the symptoms have been so clearly defined that an absolute diagnosis is always possible. Neither do I believe that we know, in all cases, whether operation is imperative.

One question is well demonstrated; recurring appendicitis should always be operated. That much is fixed. No matter how mild the case, there should be no departure from this rule. I recall one case where the first three attacks were simple and short, and

the fourth fatal. It is not certain that attacks subsequent to the first will be less severe, or that they will be more severe. They may be either, and to temporize is dangerous. There is but one mode of procedure, and that is operation.

After one well marked attack, with or without induration, there will always be difference of opinion. If there is any abdominal disturbance, operation should be advised. If there is persistence of pain, or occasional pain in the right side; if there is persistence of constipation, with colic; if there is induration, or tenderness in the vicinity of the caecum; then operation should be advised.

When perfect recovery follows a well defined attack, even then operation should be advised. This position is not so well established, but should, I believe, be taken. An appendix that has been the seat of severe inflammation may always be a danger. It may pass into a harmless state, but there is no means of knowing that. The operation for its removal is practically free from danger and should be advised.

We will now consider our attitude during the acute attack.

Of the fulminating cases there is no doubt. They should be operated at the earliest possible moment. Twelve hours' delay may be fatal. When a case begins with vomiting, and purging, pain and fever, the syndrome resembling that of cholera morbus, and the vomiting and purging cease, and tenderness and muscle reflex appear over the appendix, and the diagnosis is reasonably clear, operation is urgent. Many of these cases reveal a gangrenous appendix in twenty-four hours. I recall one striking case. A young man, in sound health, began, at noon, to have what appeared to be cholera morbus. I saw him in four hours. The next morning vomiting had ceased, but the fever was 103. Appendicitis was strongly suspected. Operation in the evening revealed a gangrenous appendix.

The moderately severe cases, where the diagnosis is certain, call for careful judgment. When the inflammation lingers, and signs of peritonitis or pus appear, surgical intervention is necessary. When these cases are watched by careful and intelligent observers, you may chance temporizing. It cannot, however, be denied that general peritonitis or abscess may steal in unnoticed, and the patient be in grave danger before you are aware of it. I well recall a case illustrating this. The patient had an acute abdominal attack that subsided in two days. The only persisting symptom was nausea. After six days the fever began to

rise and in two days the patient died. Autopsy revealed appendicitis, with a large abscess in the posterior part of the pelvis. The case completely blinded me.

This case should suggest to us that dangerous and treacherous calm, that sometimes intervenes in appendicitis. Almost all the symptoms subside after an acute onset, the patient feels better, and the physician is relieved. If you have suspected appendicitis distrust the calm—it may be an ambush. If the tenderness persists in McBurney's point, and the muscular reflex continues, and there is some meteorism, and the pulse is rapid, and the patient disproportionately weak, the case calls for surgical intervention. There is nothing in the history of the disease more difficult to estimate, nothing that requires cooler judgment, than this treacherous period of calm. Examine *per vaginam* and *rectum*, and use the most strenuous vigilance in observation. We might say of these patients what Gosselin said of strangulated hernia cases: "That they must never be left until relieved by taxis or keleotomy." They should be almost constantly under observation. It requires not a little courage to advise operation at such times. To the attendants in the sick-room the patient seems to have passed the crisis, and to be recovering; whereas he may be in serious danger, and should be operated at once. Not a few cases are lost through carelessness, or foolish hope under such circumstances.

Just here I will state, that a rapid pulse with low temperature is a more dangerous indication than a slow pulse and high temperature. In appendicitis the former indicates a toxic infection of the body, and serious depression of the nervous system. Operation is more dangerous at such times. Moving a patient, too, is dangerous at such times. I will again ask your indulgence with an illustration apropos of this. A child had appendicitis, as it seemed to me, and had fallen into this depressed state. Operation was imperative and the patient fit at two o'clock in the afternoon. He was removed to a hospital, and the surgeon refused to operate because of the collapse. The moving was the cause of the increased depression. It is the possibility of this sudden and suspicious calming of the symptoms that leads me to ask for surgical intervention in moderately severe cases. I sometimes chance it and am safe. If you ask for surgical intervention, once out of ten times you lose the patient; if you wait, and advise the so-called interim operation, the patient is always saved. If you wait too long, get general peritonitis, the mortality rises in geometrical ratio. It is not surprising that Dieulafoy says that he

never temporized with regretable measures, never indulges in the hope that the appendicitis will become chronic; the damage is already done and must be met with operation.

The most favorable type of the moderately severe cases is the one associated with a well-marked induration, or cake. When this is well defined it indicates the high probability of a well protected, and walled off peritoneum, and justifies the hope that the infection will not become general or severe. An induration is often first detected through the rectum. Very often in such instances I do not advise surgical intervention. I expect such form of appendicitis to recover. If the induration becomes soft intervention is demanded at the earliest day. Usually it does not suppurate, but gradually absorbs away in a few weeks. If it does not disappear the patient is not safe. I recall an instance where the induration remained two years, and then a second attack developed which was fatal. Persistent induration always calls for surgical measures.

There is a third class of cases, classified as mild. They last from a few hours to a few days, and are attended with no urgent symptoms. Some of them are described as appendicular colic, and typhlo-appendicular colic. The question of diagnosis is of the highest importance at such times, and is attended with great difficulty. The question usually lies between appendicitis, and ileo-colitis, though there are other possibilities. Appendicitis is almost invariably acute, with no intestinal antecedents. Ileo-colitis has usually a history of some previous bowel disturbance. In the former there is pain in the iliac region, muscular reflex, tenderness over the appendix, and no mucous irritation of the intestine. In the latter there is no well defined tenderness or pain, no muscular reflex, and mucus is seen in the stools. This last symptom, though sometimes three or four days in appearing, is important, and is a valuable indication. The establishment of the diagnosis is very desirable, for the incident is of great interest in the patient's history, in view of possible subsequent attacks, and the possible diagnosis of the chronic form of the disease, which always calls for surgical intervention. In these cases of slight and transient inflammation, or appendicular colic, I do not advise surgical measures, unless they are recurrent, in which case I do suggest them.

Treatment: The classical treatment for appendicitis is ice to the right iliac region, rectal enemata for emptying the bowels, rest, restricted diet, opium for control of pain, and no purgatives.

Beyond this there is nothing. Men of the radical school insist that there is no such thing as medical treatment; that nothing is of any avail; that to wait, is only to temporize. Dieulafoy says, that he never used medical treatment because there is none. It is, of course, impossible to say how much these medical measures do accomplish, but they certainly accomplish something in a negative, if not a positive, way. One might as well say that there is no treatment for pneumonia.

The question of when to decide on surgical intervention cannot be answered in a single formula. There are always some fatalities from operations in acute cases, and none in chronic cases. The effort should be to manage the disease so that it may reach a safe stage. This is the excuse for delaying operation. Delay is suicidal in 30 per cent. of the cases. Delay is safe in mild cases. It is the moderately severe cases that are doubtful. When the moderate case shows no induration, a rising leucocytosis, and severe paroxysms of pain, surgical intervention is necessary. When the fever, pain and acute symptoms cease, and the patient becomes very quiet, with rapid pulse, nausea, moist skin, and hyper-leucocytosis persists, operation is necessary. When acute symptoms, and hyper-leucocytosis subside, and early signs of depression intervene operation is necessary. Hyper-leucocytosis is present in appendicular colic, and leucopenia has been observed in pus cases. Thus the blood count alone is not always a guide. When the resistance of the patient is low, or the morbific organism unusually virulent, the blood count may be low. As I have already indicated, it may be a valuable symptom, and is a factor that should be reckoned with.

I am not prepared to ask for surgical intervention in every instance: always in severely acute, and chronic cases; exceptionally in mild cases, or in appendicular colic; often in moderate cases, according to the behavior of the disease.

HERNIA FOLLOWING OPERATIONS FOR APPENDICITIS; CAUSES AND MEANS OF PREVENTION.

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That hernia does follow in a certain proportion of cases after operations for appendicitis is well known to all. What kind of cases then, and what sort of operations are liable to have this as a sequel?

When an abscess is present and the necessity for drainage arises, the resulting cicatrix is often incapable of withstanding intra-abdominal pressure and a bulging of the intestine ensues. The only kind of cases in which I have seen hernia occur were those where it was necessary to pack the wound. After so-called "interval operations" hernia practically never occurs, granting that the operator has a reasonably good technique.

What has the length of the incision to do with it?

Of course, the longer the incision beyond certain limits, the greater danger there is of hernia following. There is not much difference, however, whether the incision is one inch or two inches' long. On general principles, I am opposed to small incisions. If an abscess is present—if adhesions exist, if the appendix is not easily found, or is in one or other of the many anomalous positions that it may occupy, it is bad surgery to try to remove it through a small opening. To tear out an adherent appendix through a small opening, when one cannot see what he is doing, is not good surgery. I lay the parts open freely in a difficult case; there is too much danger of tearing the bowel, of hemorrhage, of injury to the iliac vessels, or the bladder, of rupturing the appendix, of spreading the infection, etc., to justify one's trying to execute these manipulations through a one-inch or even an "inch and a half" incision. If the parts are properly sutured there is not much danger of a hernia. And if a hernia does occur—it is not serious—it produces little or no discomfort—and if need be can be remedied by an appropriate operation. Right here I may briefly discuss the desirability of wearing a bandage or abdominal supporter after operations, with a view to preventing hernia. I don't believe in their efficacy and consequently do not use them. After an operation that is done in the interval, when primary union has been secured, there is no need of them—they really weaken the belly-wall because the muscles are not called upon to contract so strongly, being aided to a certain extent by the bandage; consequently they undergo a partial atrophy from inaction. After an operation upon an acute case when the wound has to be packed, there is also no need of using a support after the wound has healed. Hernias do not appear at once after the patient gets up, but after months or years. Scar tissue contains no elastic fibres; elastic fibres when once destroyed are not regenerated. Scar tissue contracts for a certain length of time after its formation. It does not give way until this contraction ceases—after this there is danger of its stretching. Why then put on a bandage

immediately after the wound has healed? That is not the time at which there is danger of a hernia. It would be more rational to employ a supporter after six months or so—if you are going to use one at all. I am perfectly well aware that many operators of wide experience make use of bandages, and believe they tend to prevent hernia. Sonnenburg of Berlin, the best German authority upon appendicitis, *is a believer in their efficacy.*

In making the incision through the abdominal wall it is best not to cut any of the lower intercostal nerves, or the ilio-hypogastric, for changes in the muscles supplied by these nerves will ensue—and these lead to a weakening of the parietes. We cut therefore parallel with the nerves, i. e., obliquely downward and forward.

In cases which are operated upon during the interval between attacks, it is best to make use of the method suggested by McBurney. As is well known, this consists in the division of the skin and fascia; next separating the fibres of the aponeurosis of the external oblique, and then separating the muscular fibres of the internal oblique and transversalis without dividing them transversely. After cutting through the transversalis fascia and peritoneum, and removing the appendix, the parts are accurately sutured. It is important to bring into apposition the cut edges of the transversalis fascia as well as the peritoneum. The margins of the opening in the internal oblique and transversalis come into apposition without suturing provided no fibres have been transversely divided. It is well, however, to insert a couple of sutures, using the same thread that has been used in bringing together the peritoneum and transversalis fascia, so that no "dead space" may exist between these structures. Accurate coaptation of the aponeurosis of the external oblique and the superficial fascia and skin completes the procedure. When primary union occurs, it is practically impossible for a hernia to ensue after such an operation. The McBurney incision is, however, not appropriate in many cases in which an abscess exists, or when extensive adhesions are present, or other conditions necessitating prolonged and difficult manipulations are met with.

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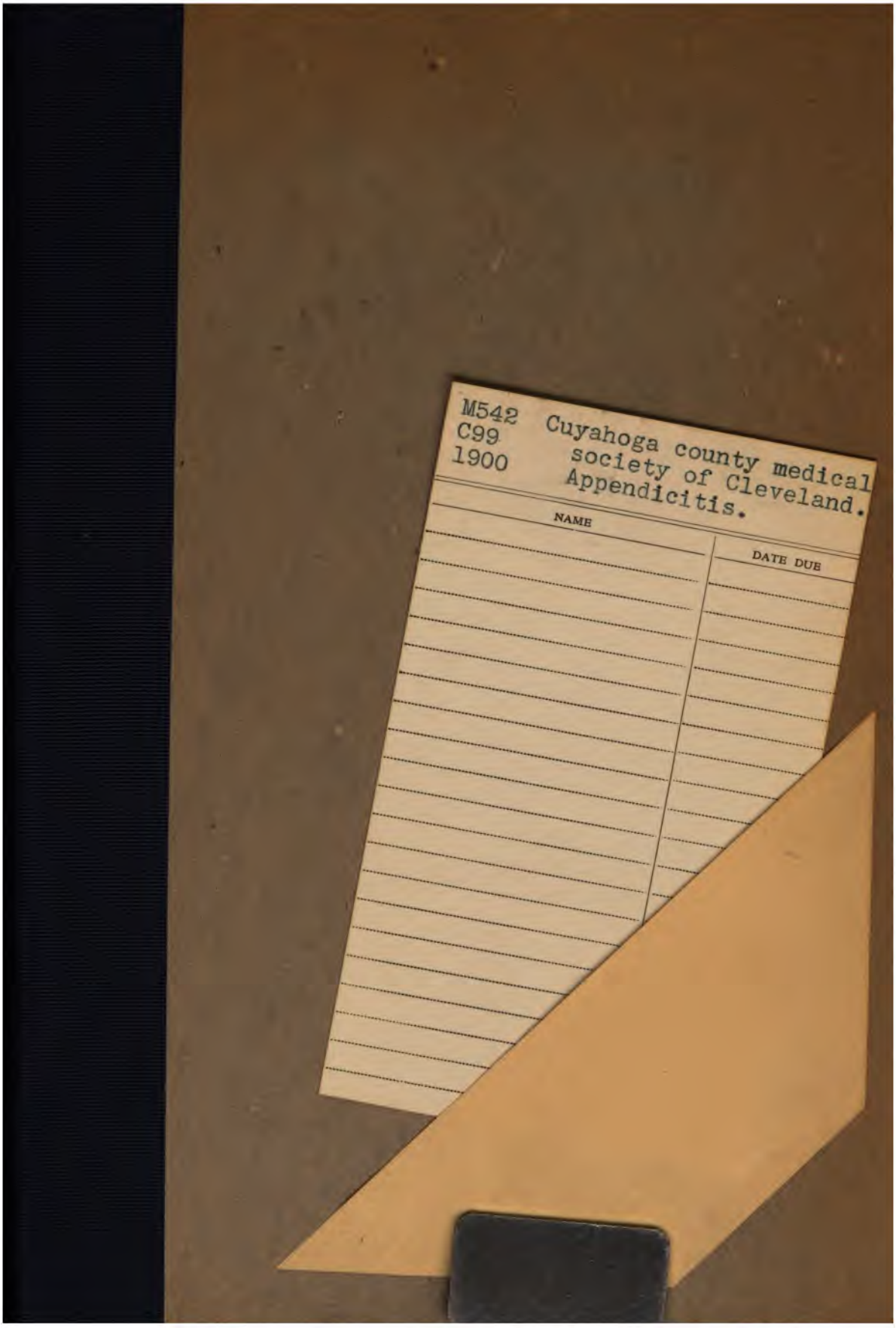
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